

THE BOTANY OF THE "CLEARS" AND "BASALT  
MASSES," COUNTY OF HUNTER, N.S. WALES.

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*(Communicated by R. T. Baker, F.L.S.)*

There is a remarkable feature in the botany of this county that, as far as I have been able to ascertain, has never yet been recorded. I refer to the "Clears." In certain parts of the county there is found to exist, or rather perhaps flourish, a flora, which, if not entirely distinct, yet differs so considerably from that of the surrounding country that it must be regarded as differentiating from it in a marked degree.

This characteristic vegetation has given rise amongst the local residents to the term "Clears," which name is applied by them to denote not only this peculiar or distinctive flora, but also the particular rich volcanic soil upon which it thrives. When I state that there is an absence of undergrowth of bushes and shrubs such as pertains in the neighbouring bush, the meaning of the word is apparent.

Grass, however, is abundant, and consequently these specially favoured localities are in much request for pasturing and other purposes. These "Clears" and "Basalt Masses" are situated in the parishes of Putty, Tupa, Parry, Gullongulong, Tollagong, Myrtle and Wareng, and lying between  $32^{\circ} 50'$  and  $33^{\circ} 5'$  S. lat., and between  $150^{\circ} 35'$  and  $150^{\circ} 55'$  E. long.; and, as far as I have been able to enumerate them, are as follows:—(1) Clear Farm, (2) Jacob's Hollow Clear, (3) Boxy or Box Tree Clear, (4) Little Clear, (5) Putty Hill, which I am informed is also called Mt. Gullongulong, (6) Condon Clear, (7) Box Bump, (8) Green Hills,

and (9) Mt. Kinderun. The plants listed in this paper were collected from all the above volcanic formations except Mt. Kinderun and Green Hills, which I have not yet had an opportunity of visiting.

The list of grasses is poor (only one species being identified) because more time has been devoted to the collecting of other species.

On approaching one of the "Clears," one is at once struck by the marked difference between the growth of the vegetation on it and that on the adjacent sandstone country, and by the absence on the volcanic soil of species growing in profusion on the sandstone, as well as by the comparative rarity of a certain species of Eucalyptus on the sandstone which is always present on the Clears, *i.e.*, *E. hemiphloia*, F.v.M.

The "Clears" are covered with a dense growth of grass upon which stock fatten rapidly. This dense growth of grass is absent on the sandstone ridges, and not so plentiful on the flats, especially those situated at a distance from the Clears.

On the sandstone ridges the Eucalypts do not attain to the same height or girth as the same species growing on the basalt, or on the flats immediately adjacent to the basalt, and which receives the decomposed volcanic matter from it.

In a former paragraph I referred to the absence of certain plants occurring on the Clears and Basalt Masses which are common on the sandstone, and I think it would not be out of place to mention the more important; for instance—*Eucalyptus eximia*, Schauer., *E. Rossi*, Baker & Smith, *E. piperita*, Sm., *E. punctata*, DC., *Angophora lanceolata*, Cav., various species of *Melaleuca*, *Leptospermum*, *Backhousia*, *Daviesia*, the various Proteaceous plants, such as *Hakea*, &c. Several species of the Natural Order Epacridæ, which flourish on the sandstone ranges, disappear immediately the basalt is met with. *Oxylobium trilobatum*, F.v.M., *Gompholobium latifolium*, Sm., and *Bossia heterophylla*, Vent, also are absent.

It appears that Clears and Basalt Masses are factors for good in any district in which they occur, as is instanced in this district

by the produce raised from farms situated on, and close to them being in excess of that of others situated farther from them.

I make no pretensions as to the completeness of this list, but I believe it to contain by far the greater number of species growing on the volcanic formations, the Natural Order Gramineæ perhaps excepted.

The geological formation of the ranges is Triassic or Hawkesbury Sandstone, with probably Pleistocene volcanic rocks, as I am informed by Mr. J. E. Carne, F.G.S.; and the geological age and origin of these "Clears" is, I understand, now being investigated by that gentleman, the results to be published by him in the Records of the Geological Survey, New South Wales; and when this information is available, the subject of this paper will be still more interesting, as the relationship, so to speak, that is found to exist between the geology and flora of this part of the county will be more apparent.

One result of these botanical notes on the "Clears" is that it shows how particular species have a penchant for special geological formations, and that although there exists land-connection between the several Clears, yet the respective species, although common to both, are absent from the intervening ground.

It is to the disintegration of the basalt from the volcanic outcrops that the valleys owe what fertility they possess, and those parts which lie closest to the Clears and Basalt Masses possess greater fertility than those farther removed.

I desire to tender my sincere thanks to Mr. R. T. Baker, F.L.S., &c., Curator of the Technological Museum, Sydney, for many kind hints and suggestions in identifying the species collected by me, and for his kindness in many other ways; and to Mr. J. E. Carne, F.G.S., Assist. Government Geologist, for information as to the formation of the ranges in the county, and for his kindness in lending me a map of the district. I must also thank Messrs. A. E. Cobcroft and L. Barnes, local residents, for accompanying me in my botanical expeditions.

I have followed Bentham's classification as nearly as I possibly could.

## Class i. DICOTYLEDONS.

## Subclass i. POLYPETALE.

Series i. *Thalamifloræ*.

## 1. RANUNCULACEÆ.

*CLEMATIS GLYCINOIDES*, DC. This species is not very common on the Clears or Basalt Masses, but it is very common in the valleys between the sandstone ranges. Flowering period, July and August.

*RANUNCULUS LAPPACEUS*, Sm. This is perhaps the most common of all Buttercups on the Clears; it is also common on the sandstone. October to April.

*R. RIVULARIS*, Banks & Sol. This was only found on the Clears in one place—Condon Clear—but is very common in Putty Creek.

*R. HIRTUS*, Banks & Sol. December to March.

## DILLENIACEÆ.

*HIBBERTIA DIFFUSA*, R.Br. Not common on the Clears, but very common on the sandy flats. This is the only species of this genus I have seen on the volcanic formation, though such species as *H. acicularis*, F.v.M., and *H. pedunculata*, R.Br., occur on the sandstone.

## VIOLARIEÆ.

*VIOLA BETONICIFOLIA*, Sm. This species is not as common on the basaltic formation as on the sandstone. April to June.

*V. HEDERACEA*, Labill. Common on the Clears in moist places. July.

## PITTOSPOREÆ.

*BURSARIA SPINOSA*, Cav. Rare on the basalt, but very common on the sandstone, where it is a pest. January to March. I have noticed that specimens growing on Darkey Creek, Bulga, reach a height of over 20 feet, and have large leaves; while those here rarely exceed 9 feet.

*BILLARDIERA SCANDENS*, Sm. Rare on the basalt, fairly common elsewhere. December.

#### HYPERICINÆ.

*HYPERICUM JAPONICUM*, Thunb. Common on the Clears, but more common on the sandy flats. The specimens on the Clears are generally larger than those of the sandstone country. November to May.

Series ii. *Discifloræ*.

#### GERANIACEÆ.

*GERANIUM DISSECTUM*, Linn. Common on the Clears, also on the sandstone. Sometimes seen upon the Basalt Masses. October to May.

*PELARGONIUM AUSTRALE*, Willd. Common on both formations. March and April.

*OXALIS CORNICULATA*, Linn. Common on both sandstone and "Clears"; but specimens on the "Clears" have generally larger leaflets. October to May.

#### RUTACEÆ.

*BORONIA POLYGALIFOLIA*, Sm. Not so common on the Clears as on the sandstone. April.

*ACRONYCHIA LÆVIS*, Forst. Rare; only two plants seen at Clear Farm. In fruit in January.

#### STACKHOUSIÆ.

*STACKHOUSIA MONOGYNA*, Labill. (*S. linariæfolia*, A. Cunn). Fairly common on Condon Clear. October.

Series iii. *Calycifloræ*.

#### LEGUMINOSÆ.

*JACKSONIA SCOPARIA*, R.Br. Rare on the basalt; very common on the sides of the sandstone ranges. This species is placed provisionally under this name in the absence of pods which I was unable to obtain at the time. October and November.

PULTENÆA RETUSA, Sm. Rare on the basalt, but very common on the sandstone ranges. May and June.

ZORNIA DIPHYLLA, Pers. Common on the Clears—at least on Condon Clear. October to February.

DESMODIUM VARIANS, Endl. October to March.

GLYCINE CLANDESTINA, Wendl. Common on both basalt and sandstone formations. October to April.

KENNEDYA RUBICUNDA, Vent. Rare on the basalt; common on the sandstone. September to November.

K. MONOPHYLLA, Vent. (*Hardenbergia monophylla*, Benth.). Mr. Maiden, in his "Flowering Plants of N.S. Wales," gives: "Leaflets 2, 3, or even 4 inches"; but the leaflets on a specimen found by me here measured nearly 6 inches.

ACACIA MELANOXYLON, R.Br. Occurs on both volcanic and sandstone formations.

A. LONGIFOLIA, Willd. Condon Clear. There are differences in plants growing on the Clears and others I have seen in a valley, near the 45-mile post, on the road from Warkworth to Putty. Those of Condon Clear have looser spikes, paler phyllodia, and lighter-coloured bark than the others. It is a rare species here. June and July.

A. VISCIDULA, A. Cunn. This plant, a shrub about 9 feet high, was found on Box Bump, and I have never seen it anywhere else in this district. The phyllodes are viscid, and glandular-dotted.

A. DECURRENS, Willd. Locally called "Black Wattle."

#### DROSERACEÆ.

DROSEKA AURICULATA, Backh. Not common on the Clears, but common on the sandstone country. July.

#### MYRTACEÆ.

ANGOPHORA INTERMEDIA, DC. Rare on the Clears, but very common on the sandstone country. A splendid stand-by in

drought, as fodder. November to January. Some of the trees flower later than others.

*EUCALYPTUS CAPITELLATA*, Sm. Called by some of the settlers "Messmate." The timber is used, though not to the same extent as *E. eugenioides*, Sieb. Not common on either formation. Fruits and buds in November.

*E. SIDEROXYLON*, A. Cunn. A few specimens of this tree were found on Little Clear, though it grows plentifully on the sandstone ridges overlooking all the other Clears. I may as well state that Little Clear is hardly a Clear in the same sense as Condon Clear, being more like the Basalt Masses, *e.g.*, Box Bump.

Mr. R. T. Baker, F.L.S., writes of this species:—"Your specimen is remarkable for the pronounced angularity of the calyx." This angularity is particularly noticeable in the fruits. February to June.

*E. HEMIPHLOIA*, F.v.M. This is the Eucalypt most in evidence on the Clears and Basalt Masses, and it is from this fact that such names as Box Clear and Box Bump are applied. I have seen this tree growing at Bulga, 13 miles from Singleton, but those growing here on the basalt are of greater height and girth than the Bulga specimens. I have only seen it growing here in one place off the basalt, and that was only a very small area, perhaps two or three acres; however, sometimes it is carried for a short distance on to the neighbouring sandstone, but perhaps these portions may have had volcanic soil on them at some former period.

This is the only Box I have seen on the volcanic formations, though I have observed two others growing on the sandstone—one, *E. Fletcheri*, R. T. Baker, growing near Clear Farm, though not actually on the basaltic formation.

*E. SIDEROPHLOIA*, Benth. Rare on the Basalt Masses, but more plentiful on the sandstone. Buds and fruit in March.

*E. CREBRA*, F.v.M. The commonest Ironbark on the sandstone, but in fewer numbers on the basalt.

*E. TERETICORNIS*, Sm. This species comes next to *E. hemiphloia*, F.v.M., as regards numbers found on the Clears, and even on the Basalt Masses. It is very common on the sandstone, but I believe the basalt specimens are superior to those found on the flats. There are two forms, but I believe the form with the long-pointed operculum predominates.

*E. SALIGNA*, Sm. Rare on the Clears, a few only being seen on the lowest levels. In the gullies and flats between the sandstone ranges two forms are to be seen, called by the settlers "Blue-gum" and "Round-leaf." These can easily be separated in the field. A settler, with many years' experience amongst timbers, informed me that the "long-leaved" form is the better timber; in fact, the "round-leaf" is rarely used. Some call the round-leaved form "Yellow Jacket."

*EUCALYPTUS EUGENIOIDES*, Sieb. The most common of all Stringybarks on both formations, though upon the sandstone it occurs more plentifully than upon the basalt.

From this list of Eucalypts it will be seen that very few species of that large genus occur on the basalt formation, and the species found on one Clear or Basalt Mass are almost certain to be found on all the others.

*E. hemiphloia*, associated with *E. tereticornis*, is more in evidence than all the rest put together. It seems to be a constant character of the Clears and Basalt Masses to grow the two species above mentioned in profusion.

Though there are only eight species in this list, yet I have collected about 22 in the district up to the present time.

#### ONAGRARIÆ.

*EPILOBIUM GLABELLUM*, Forst. Common on the Clears. November to January.

#### UMBELLIFERÆ.

*TRACHYMENE INCISA*, Rudge. Rare on the Clears, but very common on the sandy flats. December to February.



## Subclass ii. MONOPETALÆ.

## LORANTHACEÆ.

LORANTHUS CELASTROIDES, Sieb. December and January.

L. PENDULUS, Sieb. March.

## RUBIACEÆ.

OPERCULARIA DIPHYLLA, Gaertn. Not common on the volcanic formations. December to March.

POMAX UMBELLATA, Sol. Not so common on the basalt as on the sandstone.

## COMPOSITÆ.

CALOTIS DENTEX, R.Br. December to February.

BRACHYCOMA MULTIFIDA, DC. December and January.

SIEGEBECKIA ORIENTALIS, Linn. Not so common on the basalt as on the sandstone. I have observed very small insects caught by the glandular hairs on this plant. December to March.

CRASPIDIA RICHEA, Cass. Common. December to April.

PODOLEPIS ACUMINATA, R.Br. Rare on the Clears, but very common on the sandy flats.

## STYLIDÆ.

STYLIDIUM GRAMINIFOLIUM, Swartz. This species generally has longer leaves on the Clears than on the sandstone.

## GOODENIACEÆ.

GOODENIA HEDERACEA, Sm. January to April.

## CAMPANULACEÆ.

LOBELIA PURPURASCENS, R.Br. Very common on both formations. December to May.

WAHLENBERGIA GRACILIS, DC. Very common on the Clears, also on the flats between sandstone ranges. The corolla in the sandstone specimens is often very small, and almost white; while I have not yet seen this form on the Clears. September to April.

## ASCLEPIADEÆ.

*TYLOPHORA BARBATA*, R.Br. In Moore's 'Flora' the habitat of this species is given as "Coast District and Dividing Range from Port Jackson to Victoria." Very common in gullies close to the Clears, though rare on the Clears themselves.

## BORAGINEÆ.

*CYNOGLOSSUM AUSTRALE*, R.Br. Not as common on the Clears as on the sandstone country. December to May.

## CONVOLVULACEÆ.

(?) *CONVOLVULUS MARGINATUS*, Poir. Rare. December. Placed under this species until more material can be obtained to have it properly identified.

*CUSCUTA AUSTRALIS*, R.Br. Common on both volcanic and sandstone formations in moist places. November to February.

## SOLANEE.

*SOLANUM AVICULARE*, Forst. Very rare on the Clears; absent altogether on the Basalt Masses, but very common on the low land lying between Condon Clear and Box Bump.

*DUBOISIA MYOPOROIDES*, R.Br. Rare on the Clears, but very common on sandy flats near Putty Creek.

## BIGNONIACEÆ.

*TECOMA AUSTRALIS*, R.Br. Rare on the basalt, but very common on the moist sides of sandstone hills. August and September.

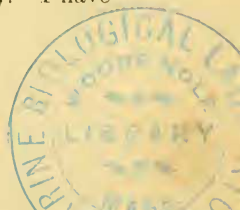
## LABIATÆ.

*MENTHA SATUREJOIDES*, R.Br. Common on Putty Hill. December to May.

## Subclass iii. MONOCHLAMYDEÆ.

## PROTEACEÆ.

*HAKEA DACTYLOIDES*, Cav. Very rare on the Basalt Masses, but very common on the sandstone. In fruit in May. I have



not observed so far any other Protead on the Clears or Basalt Masses, though many appear on the sandstone.

T H Y M E L E Æ.

PIMELIA LINIFOLIA, Sm. Rare on the Clears, though common on the sandstone. This species appears to be in flower nearly all the year round.

C A S U A R I N E Æ.

CASUARINA SUBEROSA, Ott. & Dietr. This is not the only species of Casuarina on the Clears and Basalt Masses, but it is the only one collected at present.

S A N T A L A C E Æ.

EXOCARPUS STRICTA, R.Br. Rare on the basalt; common on the sandstone.

Class ii. MONOCOTYLEDONS.

O R C H I D E Æ.

DIPODIUM PUNCTATUM, R.Br. Rare on the basalt. August to October.

DIURIS PEDUNCULATA, R.Br. Very common on the Clears and sandstone country in spring.

PTEROSTYLIS CONCINNA, R.Br. On both formations. May.

CALADENIA CARNEA, R.Br. Very common on both sandstone and basalt formations. July and August.

A M A R Y L L I D E Æ.

HYPOXIS HYGROMETRICA, Labill. Very common on the Clears. April and May.

L I L I A C E Æ.

SMILAX GLYCYPHYLLA, Sm. Not as common on the basalt as on the sandstone.

THYSANOTUS JUNCEUS, R.Br. October to December.

SOWERBLEA JUNCEA, Sm. Rare. May.

C O M M E L Y N A C E Æ.

COMMELYNA CYANEA, R.Br. Not as common on the Clears as on the sandstone country.

## GRAMINEÆ.

*ANTHISTIRIA AUSTRALIS*, R.Br. Locally called "Kangaroo-grass." It resists the frost in a wonderful manner. I have seen specimens of it with stems over 6 feet high.

## Class iii. ACOTYLEDONS.

## FILICES.

*DAVALLIA DUBIA*, R.Br. Rare on the Clears, but plentiful in moist places on the sandstone.

*ADIANTUM ÆTHIOPICUM*, Linn. Common on both formations.

*PTERIS AQUILINA*, Linn. On Condon Clear.

*BLECHNUM CARTILAGINEUM*, Swartz. Not common on the basalt, but very common on the sandstone.

*ASPLENIUM FLABELLIFOLIUM*, Cav. In shady and moist places on the Clears.